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2 wherein the locus of the intersections of said conductors with a plane transverse to said axis describes a circle.

5 5. Charged particle trapping means as recited in claim 2 wherein the spacing between adjacent ones of said conductors is uniform and the potential distribution among said conductors varies in a positionally predetermined manner.

6. Charged particle trapping means as recited in claim 1 wherein said conducting elements are comprised of two sets of circular conductors of decreasing radii which are disposed along the surfaces of a pair of imaginary right circular cones sharing a common base, the like conductors of each set being similarly energized with a predetermined potential distribution so as to provide a potential field distribution within the array offering a three dimensionally stable region for charged particles of a certain mass-to-charge ratio.

7. Charged particle trapping means as recited in claim 1 wherein said conducting elements are comprised of two sets of elliptical conductors of decreasing radii which are disposed along the surfaces of a pair of imaginary right elliptical cones sharing a common base, the like conductors of each set being similarly energized with a predetermined AC and DC potential distribution so as to create within said array an hyperboloidal potential field distribution offering a three dimensionally stable region for charged particles of a certain mass-to-charge ratio.

8. Charged particle mass filter means for the establishment of a potential distribution about an axis such that charged particles within a given range of mass-to-charge ratios caused to enter said potential distribution will have stable motion through said potential distribution and will exit therefrom substantially along said axis, and particles having mass-to-charge ratios outside said given range will experience instability and will be rejected from motion along said axis, said mass filter means comprising:

an array of conducting elements substantially symmetrically disposed about said axis and including at least two conducting portions in each quadrant spaced from said axis,

potential supply means for providing an electrical potential having both AC and DC components, potential distribution means coupling said supply means to the respective conducting elements for establishing on the different ones of said conducting elements selected different potentials such that the distribution of said selected different potentials in each quadrant around said axis is the mirror image of the distribution in the adjacent quadrant.

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9. Charged particle mass filter means as recited in claim 8 wherein said conducting elements are long straight conductors disposed parallel to said axis and spaced around said axis such that the distance separating adjacent conductors is small as compared with a transverse dimension between conductors lying in a plane including said axis.

10. Charged particle mass filter means as recited in claim 9 wherein the locus of the intersections of said conductors with a plane transverse to said axis describes a parallelogram.

11. Charged particle mass filter means as recited in claim 9 wherein the locus of the intersections of said conductors with a plane transverse to said axis describes a circle.

12. Charged particle mass filter means as recited in claim 9 wherein the spacing between adjacent ones of said conductors is uniform and the potential distribution among said conductors varies in a positionally predetermined manner.

13. Charged particle mass filter means as recited in claim 8 wherein said conducting elements are comprised of two sets of circular conductors of decreasing radii which are disposed along the surfaces of a pair of imaginary right circular cones sharing a common base, the like conductors of each set being similarly energized with a predetermined potential distribution so as to provide a potential field distribution within the array offering a three dimensionally stable region for charged particles of a certain mass-to-charge ratio.

14. Charged particle mass filter means as recited in claim 8 wherein said conducting elements are comprised of two sets of elliptical conductors of decreasing radii which are disposed along the surfaces of a pair of imaginary right elliptical cones sharing a common base, the like conductors of each set being similarly energized with a predetermined AC and DC potential distribution so as to create within said array an hyperboloidal potential field distribution offering a three dimensionally stable region for charged particles of a certain mass-to-charge ratio.

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